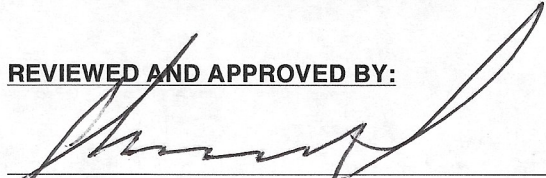


Operational Readiness Clearance (Non-beam operation)
SeaQuest E906 New Tracking Station 1
9 Oct 2015

AUTHORIZATION TO PROCEED WITH THE UNATTENDED OPERATION OF
FLAMMABLE GAS FLOW AND HV IN NEW STATION 1 OF SEAQUEST

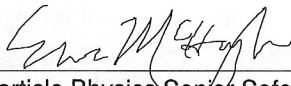
REVIEWED AND APPROVED BY:

DATE




Particle Physics Division Head
Comments/Exceptions:

10/12/15



Particle Physics Senior Safety Officer
Comments/Exceptions:

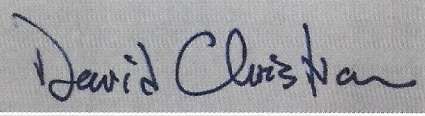
10/9/2015



Committee Chair
Comments/Exceptions: Readout electronics not included.

10/9/15

Submitted By:



Requester David Christian

10/9/15

Electronic approvals for this form are acceptable. Please forward your responses to all recipients. A signed paper form (copy) of this document will exist in the Particle Physics Division Office. The original signed document will stay with the experiment requesting clearance.

Rev Aug 2008

From: David Mertz mertz@fnal.gov
Subject: RE: availability?
Date: October 9, 2015 at 11:32 AM
To: Steve J Chappa chappa@fnal.gov, Leo Bellantoni bellanto@fnal.gov
Cc: James L. Priest priest@fnal.gov, Karen M Kephart karenk@fnal.gov

Steve, Leo already dragged me out there.

Leo,

Based on our inspection:

The gas system was inspected earlier by Karen, only comment was to lift the flexible flammable gas line off the floor and secure to the detector or other sturdy structure.

Presently the only electrical connection is a single high voltage feed to the detector, coming from a NIM crate in rack adjacent to the detector. Some of this cable was looped on the floor near the rack, but was tied up neatly inside the rack during the inspection. Otherwise the routing was satisfactory. When it is reconnected to the permanent source, the cable will need to be reconnected.

No signal cables had been connected to the detector. These will be review separately at a later time prior to operation. Due to the number of cables and limited space available, a preparing a cabling plan to expedite that work was recommended.

There are cables and hoses on the floor, under the detector and in front of the gas panel. Please remove the items in front of the gas panel to provide ready access to the panel and a clear working area in front of it. The cables below the detector are not a tripping or safety hazard, but careful training of these cables may improve reliability or reduce the chances of cable problems.

Once the securing of the gas line is done, please forward a digital picture as confirmation and we can recommend operation.

Thanks,

Dave

From: David C Christian dcc@fnal.gov
Subject: Gas line
Date: October 9, 2015 at 11:39 AM
To: Leo Bellantoni bellanto@fnal.gov



Sent from my cell phone

From: Karen M Kephart karenk@fnal.gov
Subject: RE: Flammable Gas in NM4
Date: October 8, 2015 at 9:03 AM
To: Leo Bellantoni bellanto@fnal.gov
Cc: Richard L Schmitt rlschmitt@fnal.gov

Gents:

I concur that the documentation is in order. I will need to arrange to have a look at the installation. The gas shed portion is easy ... for the experimental hall I need a contact. Leo, do you know if this is still JJ, or have you dealt directly with David Christian?

K.

Karen M Kephart
Technical Resource Coordinator
Fermi National Accelerator Laboratory
630-840-6625 office
630-485-0587 mobile
www.fnal.gov
karenk@fnal.gov

P Clean & Green: Please consider the environment before printing this e-mail

From: Richard L Schmitt
Sent: Thursday, October 08, 2015 7:55 AM
To: Leo Bellantoni <bellanto@fnal.gov>; Karen M Kephart <karenk@fnal.gov>
Subject: RE: Flammable Gas in NM4

Leo,

I am away from the Lab as well, but did look over the documentation. Based on the description both the gas shed and the chamber are risk class zero areas. The remaining task would be to look over the installation and make sure the requirements of FESHM 6020.3 for class zero are met.

Richard Schmitt
Office 630-840-4849
Mobile 630-212-8485

From: Leo Bellantoni
Sent: Wednesday, October 07, 2015 3:23 PM
To: Karen M Kephart <karenk@fnal.gov>; Richard L Schmitt <rlschmitt@fnal.gov>
Subject: Fwd: Flammable Gas in NM4

Dear Karen, dear Rich,

Jim Priest is away. Could I prevail upon you to help with the review of the revised SeaQuest flammable gas system please?

From: Karen M Kephart karenk@fnal.gov
Subject: RE: Flammable Gas in NM4
Date: October 9, 2015 at 9:41 AM
To: Madelyn Wolter maddiew@fnal.gov, Leo Bellantoni bellanto@fnal.gov, James L. Priest priest@fnal.gov, Richard L Schmitt rlschmitt@fnal.gov
Cc: David C Christian dcc@fnal.gov

Dear Reviewers:

I have completed the walkthrough of the SeaQuest flammable gas system at NM4.

The gas shed is appropriately vented and powered for flammable gas; the piping system is as described in the documentation; signage has been applied to lines, flow meters, etc., indicating flammable gas. In lieu of a fixed orifice there is an adjustable needle valve to control overall output from the gas bottles. This is located in an enclosed ventilated box, so the chance of anything dislodging it is remote. Coupled with the total inventory of two premix bottles on line at a time (see documentation provided by David), this is sufficient.

To do before flowing: Attach notes to the two racks that are not in use but can either be powered or used to power other equipment:

“Do Not Power without contacting David Christian or Paul Reimer” (or something to that effect)

The experimental hall piping and chamber have appropriate signage and the piping has sufficient protection from damage. The pieces of piping going to and from the chamber are Polyflo, chosen to minimize potential damage (and therefore leakage) when disconnection and reconnection is required. Polyflo is appropriate for the pressures involved. Of note concerning the Class 0 calculations is that even if the total inventories of the two possible online bottles plus the chamber were to empty into the hall it would still be in the same Class. There is no other flammable gas in the hall to add to the inventory.

To do at the next opportunity (but not necessary for approval to flow gas). Maddie: could you please arrange to have a flammable gas sign put on the exit to the copper vent pipe where it terminates outside the building on the west side? It is behind a locked rad (?) fence so we could not access it.

From a flammable gas perspective I recommend that SeaQuest be allow to flow as soon as the notes are added in the gas shed.

Questions?

K.

Karen M Kephart
Technical Resource Coordinator
Fermi National Accelerator Laboratory
630-840-6625 office
630-485-0587 mobile
www.fnal.gov
karenk@fnal.gov

P Clean & Green: Please consider the environment before printing this e-mail

From: David Christian dcc@fnal.gov 
Subject: Re: Flammable Gas in NM4
Date: October 8, 2015 at 11:04 AM
To: Karen M Kephart karenk@fnal.gov
Cc: maddiew maddiew@fnal.gov, emchugh emchugh@fnal.gov, priest priest@fnal.gov, Leo Bellantoni bellanto@fnal.gov, barger barger@fnal.gov, Pete Simon pgs@fnal.gov, Paul E. Reimer reimer@anl.gov, Arun Tadepalli arun.tadepalli1@gmail.com, Po-ju.Lin@Colorado.EDU Lin Po-ju.Lin@Colorado.EDU

Hi Karen,

Here (attached) is a revised version of the gas piping schematic that makes it clear that there are two outside vents. Gas flow through the chamber vents through a copper pipe outside of NM4 on the west side of the building. When we change gas bottles, we will vent a small amount of gas through a PVC pipe in the gas shed in order to make sure that air doesn't get into the chamber.

– Dave

On 10/7/15 11:58 AM, David Christian wrote:

Dear Maddie,

The new SeaQuest “Station 1” wire chamber has been installed and we are ready to start commissioning it. We would like to operate this chamber with a flammable gas mixture. Both the NM4 gas shed and NM4 itself will be risk class 0 as defined in FESHM 6020.3 (Storage and Use of Flammable Gases). A vent line to the west side of NM4 has been installed and the chamber exhaust will be vented outside.

We will use the following gas mixture:

13% Isobutane

2.5% Methylal

16% CF₄

68.5% Argon

I attach an analysis of the flammability of this gas mixture. The conclusion of this analysis is that the class 0 limit for this gas mixture is 169.4 SCF. The chamber gas volume is 60.1 cubic feet, so NM4 will be class 0. We have two sources for premixed gas, Matheson and Airgas. Cylinders purchased from Matheson contain 31 SCF of gas and cylinders purchased from Airgas contain 22.2 SCF of gas. No more than 5 cylinders of premixed gas will be kept in the gas shed at any time. This will ensure that the gas shed is also class 0.

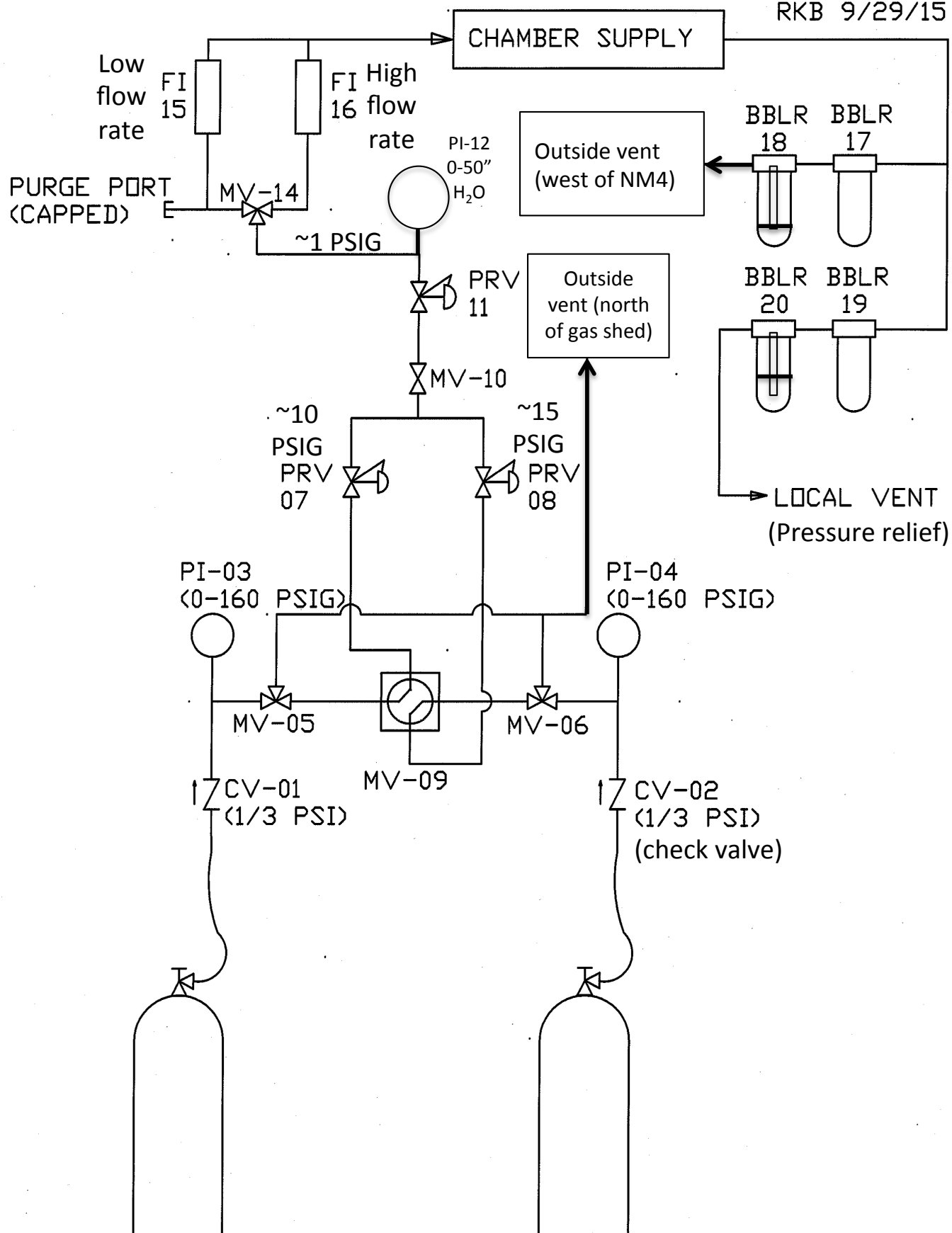
I also attach a diagram of the gas system. All supply piping in the gas shed is ¼ inch copper, as is piping between the gas shed and the gas rack to the west of the Station 1 wire chamber. Plastic pipe is used to connect the wire chamber to a gas manifold just to the west of the chamber. The operating pressure of the gas in the plastic pipe is << 1 PSIG. The gas shed has a PVC vent line that is open to air outside the shed.

We have tested the system using non-flammable gas and found the leak rate to be below ~0.04 SCF/hr. The test was done by setting the input flow to 0.04 on the low flow rate flow meter and observing that the chamber output bubbler bubbles at this input rate. This is an approximate measurement since the flow meter has not been calibrated recently and was not calibrated for this gas mixture.

I am happy to answer any questions and can be available to show the installation to members of the safety committee whenever they would like to see it. I hope we can start flowing flammable

SEAQUEST FLAMMABLE GAS

RKB 9/29/15



From: Richard L Schmitt rlschmitt@fnal.gov
Subject: RE: Flammable Gas in NM4
Date: October 8, 2015 at 7:55 AM
To: Leo Bellantoni bellanto@fnal.gov, Karen M Kephart karenk@fnal.gov

Leo,

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Richard Schmitt
Office 630-840-4849
Mobile 630-212-8485

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Sent: Wednesday, October 07, 2015 3:23 PM
To: Karen M Kephart <karenk@fnal.gov>; Richard L Schmitt <rlschmitt@fnal.gov>
Subject: Fwd: Flammable Gas in NM4

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Jim Priest is away. Could I prevail upon you to help with the review of the revised SeaQuest flammable gas system please?


Thanks,

Leo

Dr. Leo Bellantoni
(630)730-2155
MS 357, Fermilab Batavia, IL 60510

Begin forwarded message:

From: David Christian <dcc@fnal.gov>
Subject: Flammable Gas in NM4
Date: October 7, 2015 at 11:58:59 AM CDT
To: maddiew <maddiew@fnal.gov>
Cc: emchugh <emchugh@fnal.gov>, priest <priest@fnal.gov>, Leo Bellantoni <bellanto@fnal.gov>, barger <barger@fnal.gov>, Pete Simon <pgs@fnal.gov>, "Paul E. Reimer" <reimer@anl.gov>, dcc <dcc@fnal.gov>, ..

From: David Christian dcc@fnal.gov 
Subject: Flammable Gas in NM4
Date: October 7, 2015 at 11:58 AM
To: maddiew maddiew@fnal.gov
Cc: emchugh emchugh@fnal.gov, priest priest@fnal.gov, Leo Bellantoni bellanto@fnal.gov, barger barger@fnal.gov, Pete Simon pgs@fnal.gov, Paul E. Reimer reimer@fnal.gov, dcc dcc@fnal.gov, Arun Tadeipalli arun.tadeipalli1@gmail.com, Po-ju.Lin@Colorado.EDU Lin Po-ju.Lin@Colorado.EDU

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I am happy to answer any questions and can be available to show the installation to members of the safety committee whenever they would like to see it. I hope we can start flowing flammable gas soon.

Best wishes,
David

	
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Seaqst_Flmmbl-
gas_DEVIC...50929.xlsx